Innocuous mechanical stimulation of the neck and alterations in heart-rate variability in healthy young adults.


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FROM ABSTRACT:

The present study examined the effects of cervical spinal manipulation, a widely applied form of physical therapy, which involves innocuous mechanical stimulation, on heart rate and heart-rate variability, in a cohort of healthy young adults.

Using a cross-over treatment design, with a one-week washout period and, in contrast to a sham procedure, the authentic manipulation produced significant alterations in both heart rate and measures of heart-rate variability calculated from power spectrum analysis.

In particular, results may reflect a shift in balance between sympathetic and parasympathetic output to the heart.

THESE AUTHORS ALSO NOTE:

It is established that noxious physical and psychological stimulation effect autonomic and cardiovascular function in humans.

Also, innocuous mechanical stimulation of the neck via spinal manipulation, is capable of eliciting changes in heart rate and blood pressure.

In this study, these authors used a cohort of 25 healthy young adults without neck or shoulder pain.

“The mechanical stimuli were applied to the first and second (C1 and C2) cervical levels.”

Both sham and authentic manipulations were performed by a licensed doctor of chiropractic.

The manipulations were done supine with limited rotation and no extension, and an audible was achieved. The manipulation was described as a “supine cervical rotary adjustment.” It took no more than 5 seconds.

The sham manipulation used the same set-up, but there was no thrust and no audible.
During both the real adjustment and sham adjustment, heart function was monitored with an electrocardiogram (ECG).

ECG showed that in the first 5 minutes following the experiments that the real adjustment group had a significant reduction in heart rate as compared to the sham adjustment group.

**[IMPORTANT, as it shows inhibition of the sympathetic nervous system].**

“In the cohort of healthy young adults described herein, authentic spinal manipulation was associated with changes in heart rate and heart-rate variability, which could not be duplicated with sham manipulations.”

“The distinguishing features of the authentic manipulation are the high-velocity, low-amplitude thrust applied to and resulting in cavitation of an intervertebral joint.”

“In seeking to explain the observed effects, one is necessarily drawn to mechanisms involving afferent input from receptors in cervical tissues.” **[IMPORTANT]**

“With regard to the role of neck afferents, in this instance, it would appear that the stimulation applied was essentially innocuous.”

“Hence, attention is drawn to the role of low-threshold mechanoreceptors in the cervical spine and adjacent musculotendinous tissues.”

**[I disagree. I believe that other articles argue that the cavitation process fires high-threshold mechanoreceptors, resulting in inhibition of pain, inhibition of muscle tone, and inhibition of the sympathetic nervous system].**

CONCLUSIONS:

“An authentic spinal manipulative procedure, executed in the supine position, was associated with changes in heart rate [inhibition of heart rate] and autonomic output to the heart in healthy young adults.”

“Similar effects were not elicited by a sham procedure.”

“The distinguishing features of the authentic procedure are a high-velocity, low-amplitude thrust directed to and resulting in audible cavitation of an intervertebral joint.”
KEY POINTS FROM DAN MURPHY

1) The spinal adjustments used in this study were to C1-C2 and involved traditional supine rotary maneuver that achieved audible cavitation of the joint.

2) The adjustments were done by a chiropractor.

3) The ECG showed a significant reduction in heart rate as compared to the sham adjustment group, which supports inhibition of the sympathetic nervous system.

4) The results also support that upper cervical spinal adjustments alter the balance between sympathetic and parasympathetic output to the heart.

5) The leading explanation for the observed sympathetic inhibition of heart rate is that it is subsequent to mechanical afferent input from receptors in cervical tissues.

6) Other studies have also shown that innocuous mechanical stimulation of the neck via spinal manipulation is capable of eliciting changes in heart rate and blood pressure.